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ABSTRACT

Two groups of five preschool children were trained to press a key for marbles for four sessions of variable ratio reinforcement (VR6). Subsequently, response decrement for the groups was compared during conditions of fixed and variable differential reinforcement of other behavior (DRO and VDRO). Fixed DRO was more effective for decreasing response rate. The differences were independent of original baseline response rates. Development of "superstitious" or other behavior during fixed DRO possibly facilitated the more effective response elimination in those conditions. (Author/MS)

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Presented at the American Psychological Association Convention in Honolulu, Hawaii, September 1972.

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Variable Differential Reinforcement of Other Behavior (VDRO): Its Effectiveness as a Modification Procedure.[1]

Katherine E. Reuter and Judith M. LeBlanc

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Differential reinforcement of other behavior (DRO) is an effective procedure for decreasing specified behaviors. This effectiveness has been demonstrated both in the use of DRO as a modification procedure to decrease undesirable behaviors (e.g.: Doubros and Daniels, 1966; Bostow and Bailey, 1969) and in its use as a reversal procedure for demonstrating reinforcer control over previously manipulated behaviors (e.g.: Sherman, 1965; Reynolds and Risley, 1968; Goetz, Holmberg and LeBlanc, 1972).

Most studies which compared the efficiency of DRO with other response decrement procedures (e.g., extinction), were conducted in the animal laboratory (Uhl and Garcia, 1969; Davis and Bitterman, 1971; Zeiler, 1971). These studies always employed a fixed time during which no response was to occur as the criterion for reinforcement during DRO. Further, these intervals were usually short (e.g., 10, 20 or 30 sec).

Systematic application of specific timed contingencies is more difficult to obtain in applied research than in the laboratory where intervals can be programmed with electromechanical equipment. Therefore a time interval during DRO might not always be precisely a fixed number of seconds. Therefore the time for no-responding during DRO in applied research might more adequately be described in terms of variable-intervals. These programmed differences imply that the extension of laboratory results to application in the natural environment should be undertaken with some caution

since there might be different end results.

To examine differences in potential outcome, the present study compared response decrement during fixed-interval DRO and variable-interval or VDRO. This study was a follow-up of the study first presented by LeBlanc and Reuter (1972).

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Two groups of five preschool children, aged 3 to 5-yrs, were trained to push a telegraph key to obtain a cupful (50) marbles in a laboratory session. If the subject obtained all marbles within a 10-min session, he could trade them for a toy chosen before the beginning of the experimental session. A token, redeemable in the preschool classroom, was earned daily for participating in the research, regardless of the number of marbles obtained.

After a brief demonstration and shaping period (4-5 marbles), the subject was seated alone in a small room in front of the response panel. The experimenter observed the sessions through a one-way mirror from an adjacent room which housed the electromechanical equipment used to program the contingencies and record the data.

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All subjects were initially programmed for four sessions of variable ratio 6 reinforcement (VR6). Mean responses per min revealed an ascending response rate across sessions for both groups, which leveled off at 100 responses per min.

Group I was then programmed for 10 sessions of DRO, during which marbles were delivered every 5 sec if the subject did not respond. The interval prescribed for "no responding" reset either when a response was made, or when

a marble was delivered. Group II was programmed for a variable-interval 5-sec DRO. The intervals between reinforcers were systematically randomized to provide an average interval of 5.3-5.5 sec, with a range of 2-10 sec.

Group I's response rate during fixed DRO 5-sec decreased to near-zero by the fifth session. The group data are representative of all subjects in this group. One subject stopped responding by the second session; two, by the third session; and one each by the fourth and fifth session. In contrast, the mean response rate of Group II never decreased to the near-zero level, and the decrease which did occur was gradual and variable. Responding of two subjects in this group did reach the near-zero level by the fifth session of VDRO and one additional subject reached this level by the sixth session. The remaining two subjects in the group never responded at the near-zero response rate.

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The individual data for these two subjects, whose resistance to response decrement during VDRO was great, are shown in Fig 2. The initial VR6 rate of Subject 1 averaged 122 responses per min, and of Subject 2, 64 responses per min. Despite this difference, their responding during VDRO was very similar. A return to VR6 resulted in higher response rates for both subjects. Past research (LeBlanc and Reuter, 1972) has shown that resistance to response decrement decreased across subsequent applications of DRO. These results were similar to those obtained for repeated extinction (Bullock and Smith, 1953). To test this finding for variable DRO, these two subjects were again put under the VDRO contingency. Though their response rates during the first session were lower

than during the first session of the first application, response rates across sessions were similar to those during the first application.

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Response patterns during DRO and VDRO were different. These cumulative records per two Group I subjects during the first session of fixed DRO show that the subject emitted a burst of responses, paused the required 5-sec, received a marble, emitted another burst of responses, paused, received a marble, etc. Experimenter observations also found that the DRO subjects exhibited rhythmic, "superstitious" behaviors, such as tapping the response panel, rocking, etc.

Slide 5 About Here

These are two examples of cumulative responding by subjects during variable. The cumulative record for Subject 5 was typical of all of the subjects. Despite the fact that they stopped responding long enough to obtain 5-10 marbles, they again emitted long runs of responses before pausing. These long response runs appeared to occur most often during the longer intervals of no-responding, but not always. The record for one of the highly resistant subjects (Subject 1), did show a response pattern similar to that emitted by the fixed DRO subjects. This occurred in the 20th session during the second VDRO application. This was the only VDRO subject to demonstrate any response pattern and it occurred only after considerable exposure to the schedule. However, in this subject's case, this pattern or chain of behavior served to maintain her rate of response rather than to reduce it as in fixed DRO.

Slide 2, repeat

Group I, which responded at a minimal rate for the last six DRO sessions, recovered its baseline rate gradually. However, Group II showed no resistance to reconditioning (i.e., responding resumed immediately). This was probably an indirect function of variable DRO, i.e., response rates during the previous VDRO, were high and thus response resumption began at a higher rate in the subsequent VR6 condition.

In summary, response decrement occurred more rapidly during DRO than during VDRO. In fact, responding af all DRO subjects was eliminated within two to five sessions. Three of the VDRO subjects also stopped responding within four to six sessions. However the VDRO procedures were totally ineffective for eliminating the responding of two of the five subjects in this group. The individual subject's initial VR6 rate was not a predictor for response decrement during either DRO or VDRO.

Response decrement during fixed DRO was invariably accompanied by the development of patterns of "superstitious" responding. Accidental reinforcement of this "other" behavior seemed to facilitate decrement of the key-press response and alternating of key-press and "other" responding produced a cyclical situation which corresponded to the consistent 5-sec DRO interval. However, these superstitious responses ceased after one or two sessions. Past studies have indicated that the specification of an alternative response to be reinforced increases response decrement during extinction (Holz, Azrin and Ayllon, 1963; Leitenberg, Rawson and Bath, 1970). In the present study, the subjects developed alternative responses which was accidentally reinforced and served to facilitate response decrement.

In contrast, only one of the VDRO subjects displayed such a response

pattern, and only after extensive exposure to the schedule. The patterned responding was facilitative, in that it was the first time the subject obtained all 50 marbles within one VDRO session. Thus the "superstitious" use of response patterning during VDRO produced the same results for this subject as patterning did for subjects during conditions of fixed DRO. Because the VDRO subjects tended to resume responding during the longer intervals of no-responding (e.g., 7-10 sec), perhaps superstitious behavior which the subjects may have been emitting was disrupted.

In conclusion, varying by 3-5 sec the interval of no-responding required to obtain reinforcement within a session substantially decreases the effectiveness of DRO for eliminating the key-press responding of preschool children in a laboratory setting. Therefore, it would appear that the variability of interval length which frequently occurs in the application of DRO in applied settings could be detrimental to the effectiveness of using DRO to decrease or eliminate responding.

Footnote

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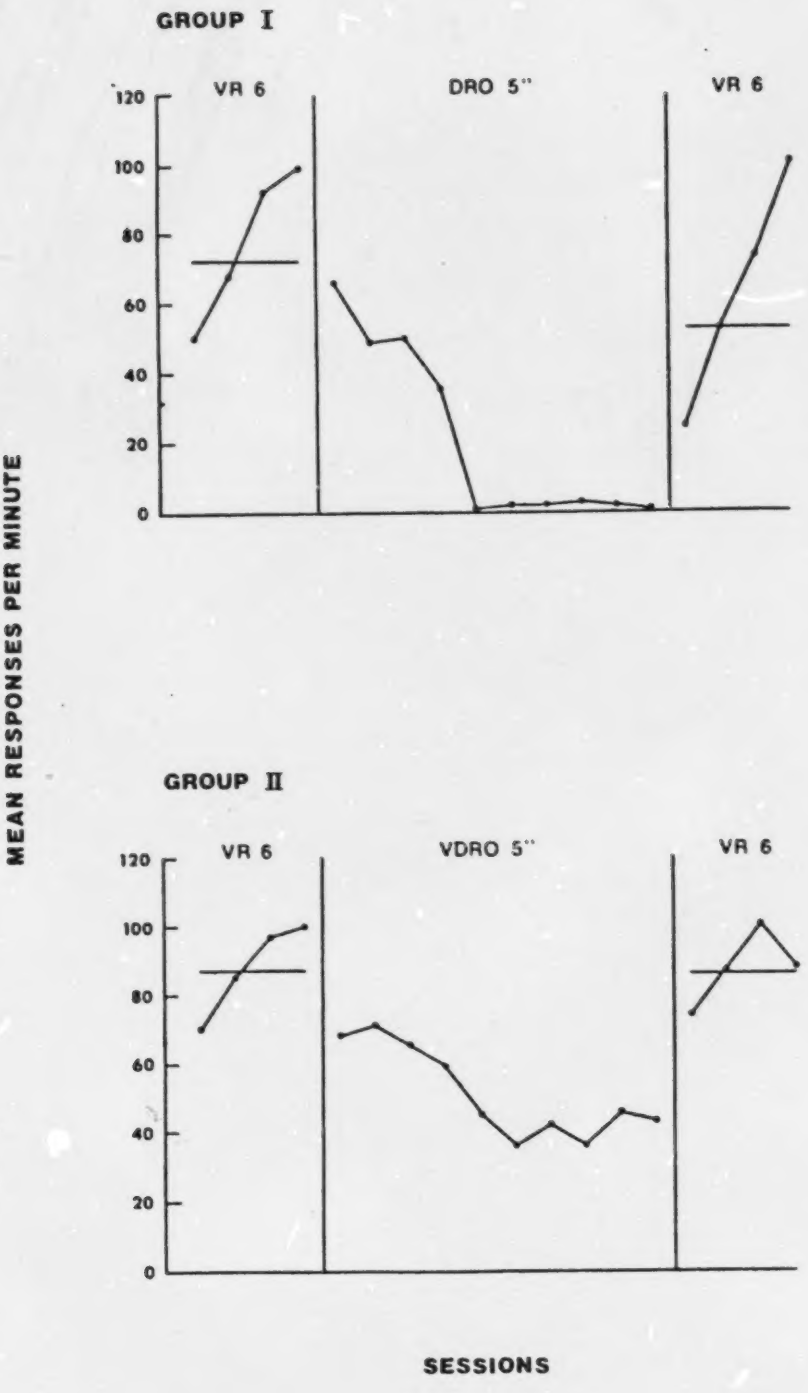
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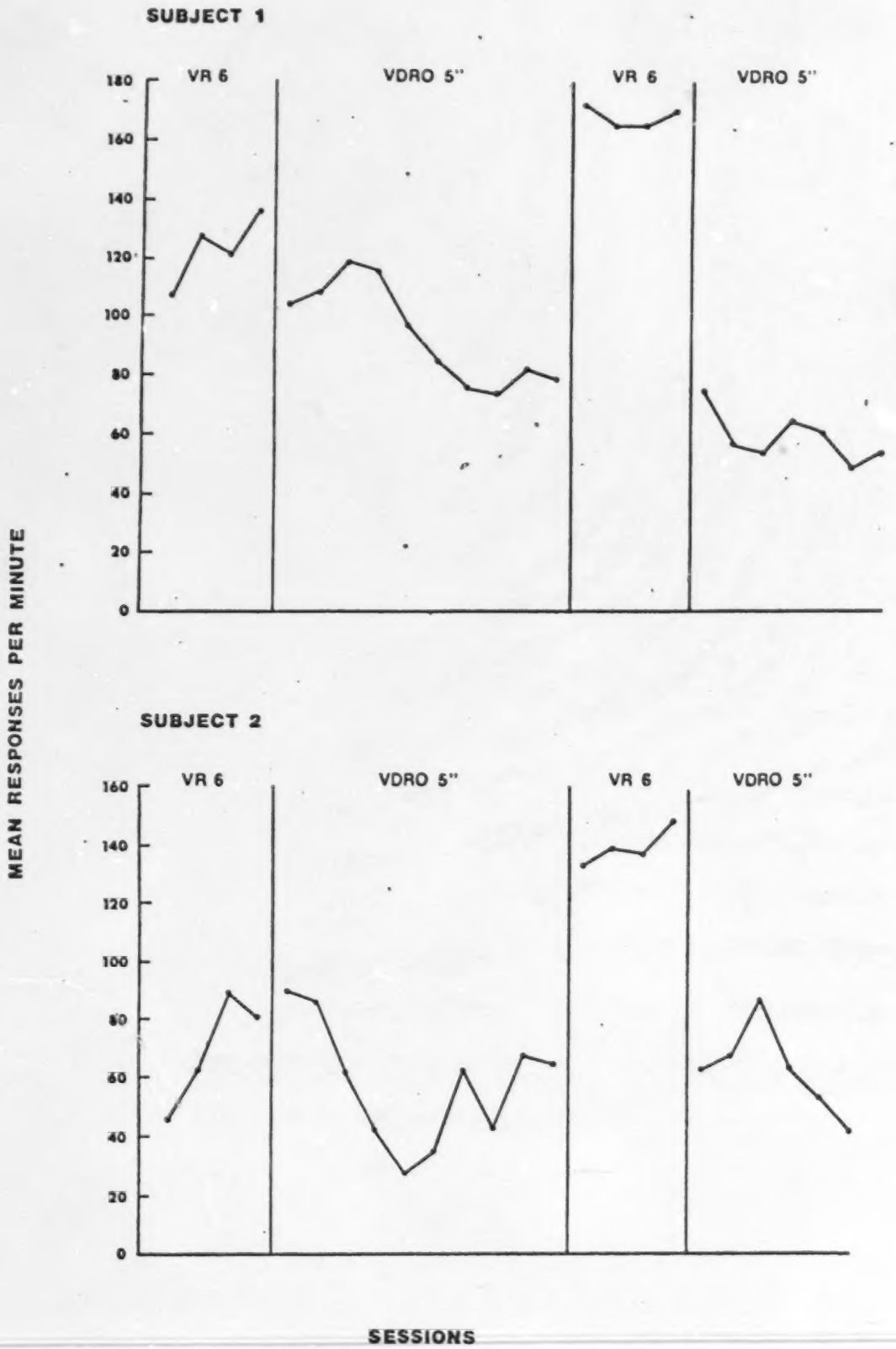
VR 6
DRO 5"
VR 6
120
100
80
60
40
20
0
GROUP II
VR 6
VDRO 5"
VR 6
120
100
80
60
40
20
0
MEAN RESPONSES PER MINUTE
SESSIONS


SUBJECT 1
VR 6
VDRO 5"
VR 6
VDRO 5"
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160
140
120
100
80
60
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SUBJECT 2
VR 6
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MEAN RESPONSES PER MINUTE
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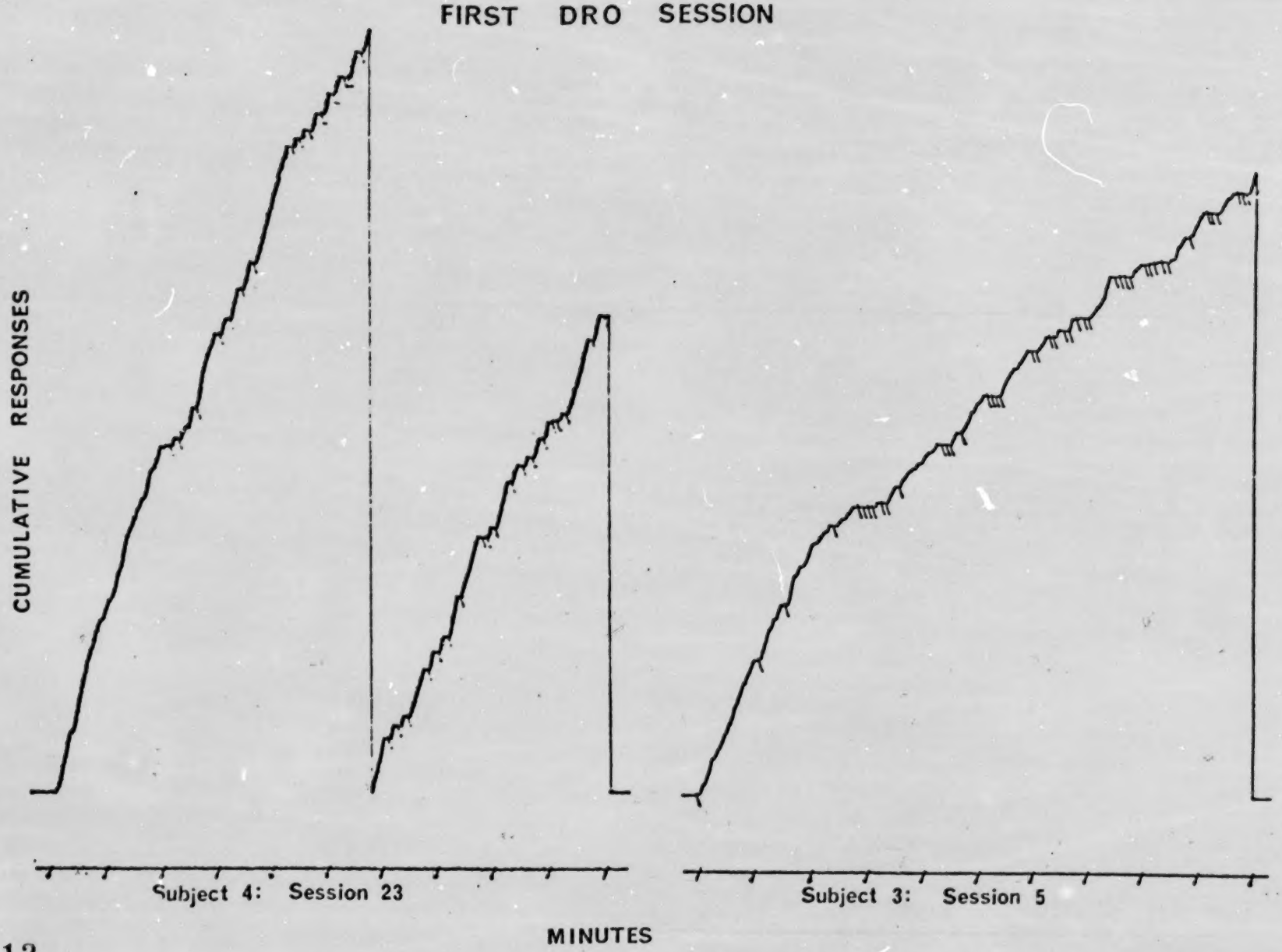
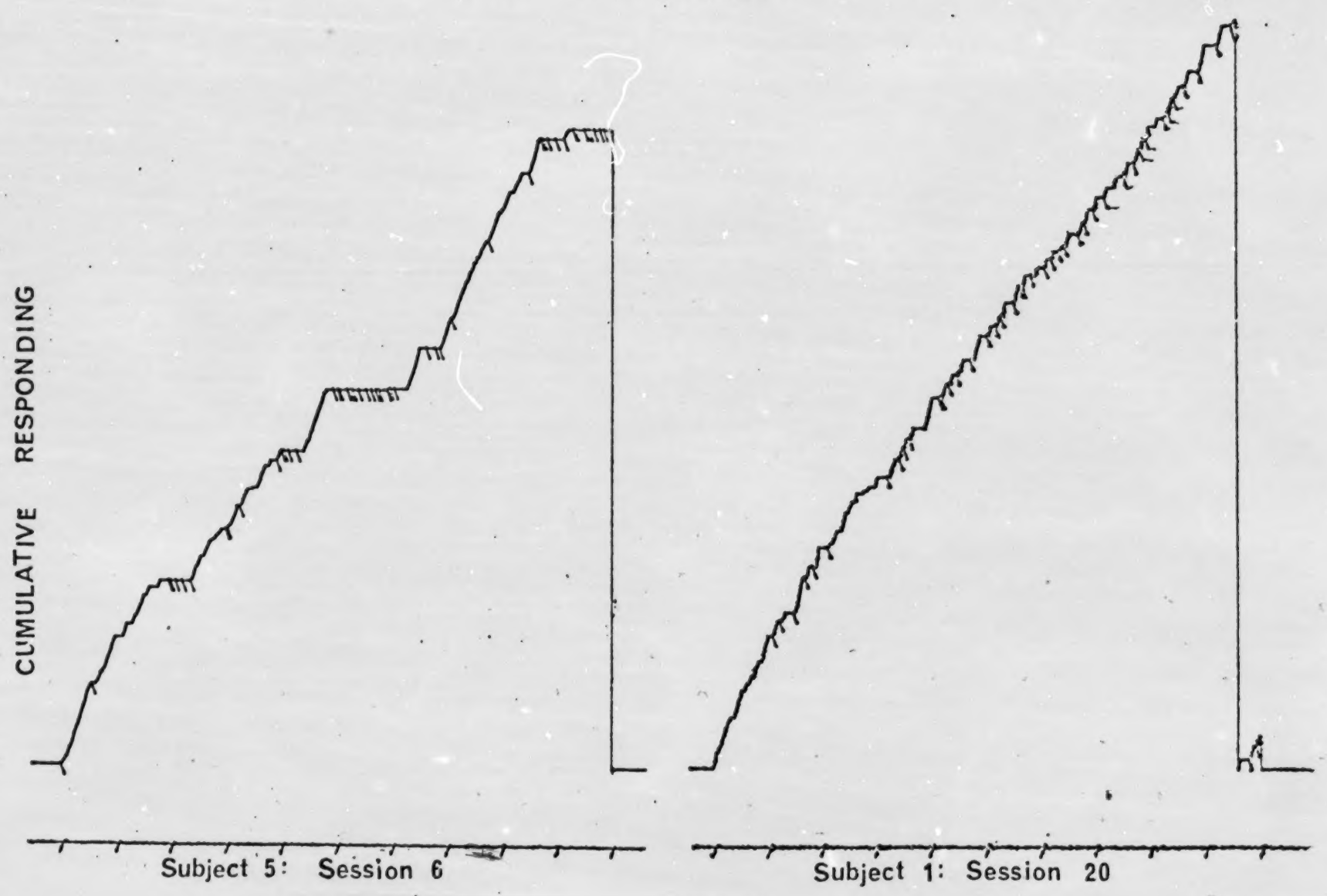

FIRST DRO SESSION
CUMULATIVE RESPONSES
Subject 4: Session 23
Subject 3: Session 5
MINUTES


VDRO RESPONDING
CUMULATIVE RESPONDING
Subject 5: Session 6
Subject 1: Session 20
MINUTES